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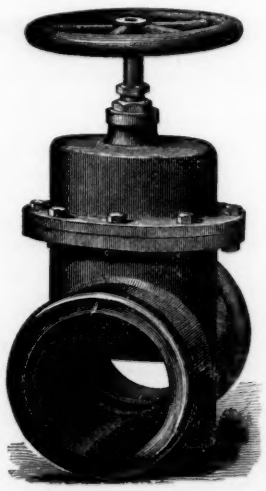
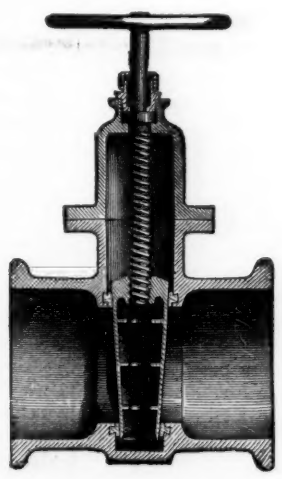
Gas Valves for Street Mains.

It is a fact well known to many that in cases of large fires in our cities and towns, much of the loss sustained is due to gas escaping from broken gas pipes and pouring into the apartments of a building a flood of gas which may take fire, or which mixing with the air forms an explosive compound sufficient when ignited to destroy not only the partition walls of the building and so extend the fire, but also to injure and endanger adjoining buildings. The supply pipes extending from the street mains are connected by lead pipes with the meters, the shells of which are tinned iron, commonly called sheet tin, and from these the ordinary gas pipes of iron extend to the various parts of the building. If a fire takes place in a celler the lead pipe and meter are liable to be soon melted, and a flame of far greater intensity is added to that of the burning wood or other material; the same result occurs with the breakage of the iron distributing pipes in the other portions of the building, an accident always liable to occur with a fire of any considerable extent.

In case of fire more or less gas escapes from meter connections and broken pipes, carrying the flame from building to building, like the torch of an incendiary, or mixing with the air in apartments as yet untouched by fire, forms an explosive compound, which a spark is sufficient to ignite.

The gas flame, moreover, is not only much more intense than that of the material of which the building is composed, but it cannot be extinguished by any amount of water thrown upon it, and continues to burn with undiminished intensity. The extent of the great fires which have occurred within short time in New York, Boston, Chicago, and many other cities, must be attributed in a great measure to this subtle and highly combustible material, and we see no more practicable and certain means of avoiding this danger than that now adopted in some cities, of inserting gas valves at the junctions of certain streets, so that in case of fire in any particular district, by the closing of a few street main gas valves, the supply of gas so fatal in extending a large fire at its commencement, may be shut off from the district in which the fire occurs, or from any neighboring district to which it is liable to extend. It seems strange that a measure so simple and of comparatively so little cost, has not long ago been adopted.





In the earlier history of the construction of gas works, some valves were introduced to cut off the supply in case of leakage, but owing to the difficulty of closing them when required, they did not come into general use; indeed it was found that the working parts exposed to air and moisture became rusted, and if the valves were closed for a considerable time, the gates adhered to the seats and were opened with difficulty. From these causes therefore they did not accomplish the end required, and their general use was abandoned.

Within a few years valves of a different construction and obviating these difficulties have been brought into use, but, until recently, we believe, they have not been applied to street gas mains to any considerable extent, for the accomplishment of the important purpose above mentioned.

This subject is one of interest not only to property owners, to the public at large, and to insurance companies, as a means of lessening their liabilities in case of fire, but it is also worthy of the attention of gas light companies, on account of the great loss of gas which they sustain on the occurrence of any extensive fire, and the labor incident to digging down to the pipes and cutting off the gas.

The most perfect valves for gas works and street mains are those known as the Chapman Valves, which have been in use during the past five years, and have received the highest commendations from all who have used them. Their peculiar construction renders them superior to any other valves made for gas purposes. They have a direct passage of the full diameter of the pipe; the gate is a hollow tapering plug, prevented from turning or coming in contact with the seat until the valve is closed. The seat is an alloy similar to Babbit metal, securely dove-tailed into the body of the valve; the plug rises and falls on the spindle in opening and closing.

All the working parts are enclosed within the body of the valve and are thus protected from rust. The stuffing-boxes and glands are made of brass and in the very best manner; and for compactness, simplicity of construction, and durability, as well as appearance, they have never been equalled. One great advantage which these valves possess is in the non-corrosive seats, the alloy used being especially prepared for this purpose, so that gas coming in contact with it has no action upon it.

For further information apply to the Chapman Valve Manufacturing Company, 77 Kilby street, Boston, Mass.

Buffalo.—The common council has cancelled the contract of John Hickler, for boring the water-works tunnel under the lake, and will advertise for proposals to complete the same.

Chemical Repertory.

No. 131.—April 16, 1875.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1396. Gramme's Magneto Electric Company.—This company, which has been formed to supply the celebrated magneto-electric machines of M. Gramme to the public, has been received with great favor, the shares being at present quoted at 1½ premium. The machine is available for many useful purposes in the arts and manufactures. It produces a light cheaper than gas by nearly one half, and much more brilliant, and in addition to these advantages the light can be used in mines, collieries, and underground work in general, and for submarine purposes. It can be used for silver and nickel plating, for depositing copper, and for gilding, bronzing, and etectrotyping. It can be used in the reduction of metals from their ores, and to an unlimited extent in chemical manufactures. —*Iron.*

1397. New Compounds of Coal-Tar Colors.—Boettger finds that when an alcoholic solution of any aniline color is mixed with a sufficient quantity of infusorial earth (sometimes called mountain flour, a minutely divided silica), water added, and the mixture placed on filtering paper, the liquid will run off clear, while the earth retains all the pigment. Hitherto compounds of alumina only have been used for such purposes, to make the so-called lakes (carmine lake, madder lake, etc). The behaviour of the excessively cheap infusorial earth to the aniline colors here described will undoubtedly lead to some practical application.

1398. New Method of Preserving Meat.—A method for the preservation of meat, by keeping it in a cool, dry chamber, has been communicated to the French Academy by M. Tellier, well known to the inventor of very efficient ice-producing machinery. His new device consists in the employment of methylic ether, a substance that is gaseous at ordinary temperatures and atmospheric pressure, but which can be reduced to a fluid by a pressure of eight atmospheres. The methylic ether is condensed and then allowed to expand in contact with metal compartments containing a solution of chloride of calcium, which it reduces to a low temperature. Air is blown through this apparatus, its moisture is deposited as hoar frost on the metal, and it passes in a dry and cold state to the chamber in which the meat is placed. It is found that the flavor of the meat is not injured by retention in this situation for forty to forty-five days, although it is said to acquire a greasy taste after that period.

1399. Wholesome Truths.—An English paper, the Rochdale *Observer*, says:

"Few are aware of the enormous wear and tear in the manufacture of gas. The most expensive part is in the retort-house, where the retorts and part of the brickwork require to be altogether renewed about every other year: and when we consider the rapid destruction that is going on, the liability to accidents, the fact that not a single moment in the year must the gas be turned off from the consumers, that the manufacture must go for 24 hours every day, night and day, throughout the year, that it is impossible to store during the winter more gas than what is consumed say between 4 o'clock in the afternoon and 11 at night, that sometimes there is not a half hour's stock beforehand, and at times it is consumed at the burner within a few minutes after manufacture—bearing in mind all this, and the class of workmen to be dealt with, the care and the constant attention, together with the engineering, architectural, chemical, mechanical, and business capabilities required, we cannot consider the position of a gas manager otherwise than as an important and responsible one, requiring and deserving the support of the consumers, and a little more co-operation and charity than is usually given to such officials."

1400. Spontaneous Combustion of Charcoal.—The woods generally used for the production of charcoal are those of the cornel tree, the willow and the alder; these are well suited to the purpose, but the cornel tree is used for the best kinds of sporting powder. The wood is converted into charcoal by heating in cylinders of iron. When the charcoal is drawn out of the cylinders, it is placed in other iron cooling vessels fitted with air-tight doors. It is left in these for a space of about fourteen hours, at the end of which it is generally cool. It is then taken to the mill to be ground, and afterwards to be mixed with the other ingredients to make cannon powder. But a curious phenomenon has been noticed frequently at this stage, and which might indeed be fraught with danger if the operations should be unduly accelerated. The powdered charcoal frequently becomes hot, and has been known to fire spontaneously, the day after the grinding. This is explained, no doubt, by the fact that the charcoal absorbs large quantities of oxygen into its pores by capillary attraction, and that the condensation of the gas in the interior is the cause of the heat, and the non conducting power of the charcoal the cause of its spontaneous firing. The quantity of gas absorbed is increased by the height to which the original temperature had been raised, The absorption also of the gas is much more rapid in the powdered condition than in that of sticks.

The Construction of Gas Works.

At a recent meeting of the British Institute of Civil Engineers, Mr. H. E. Jones read a paper on "The Construction of Gas Works," from which we make the following interesting abstract:

The subject of the paper was the consideration of what types of gas making appliances were cheapest in construction as well as most efficient in action. The site should be selected chiefly for facilities in receiving and delivering material by rail or water. Every section, of which the most important was the retort house with its contents, should be so constructed as to admit of extension without involving destruction. Opinions were divided, whether the house was best with the retorts upon the ground level, or on a "stage." The author had come to the conclusion, that when there was a ready sale for coke from the ground floor of the stage houses as fast as it was made, a saving of labor, as compared with a ground floor house, was effected; but not when the coke had to be stacked outside the house. A comparison of the manufacturing wages for the year 1873 of those metropolitan gas companies employing stage retort houses and others using ground floor houses, showed a saving by the former of 48d per 1000 cubic feet of gas sold. On the other hand, the cost of a stage retort house, complete with retorts and fittings, and having suitable coal stores, ranged from double to three times that of the simpler form of house for the same capability of production. The cost of the stage house was not less than from £16,000 to £18,000 per million cubic feet of gas produced per diem, or £800 more than the ground floor house. This would require, at the usual rate of interest, £800 per year, to which must be added the wear and tear at 29 per cent. = £160, making an annual extra charge upon working of £960. Allowing a deduction for extra labor on coke, the net saving was probably about one-third of a penny per 1000 cubic feet of gas. Supposing the maximum annual make to be 203,670,000 cub. feet, the saving on this quantity would amount to £282, which fell short of the extra annual charge by £678. Of the various retorts the round form was undoubtedly the strongest and most enduring, and the oval the weakest; but the latter and the D shape were capable of working heavier proportional charges. The greater the number of retorts within one oven, and worked by one furnace, the greater the economy in fuel; as the surface of the enclosing walls, and *pro tanto* the loss of heat by radiation, were thereby reduced in proportion to the capacity for carbonization.

The effect of the high temperature at which coal was best carbonized was that, through the dip pipes, the liquid contents of the hydraulic main were subjected to a continuous blast of gas from the white hot sides of the retort. The stagnant tar, therefore, was boiled until its fluidity was gone. This produced pressure on the retort, causing loss through its pores, active deposition of carbon on its sides, and a constant choking of the ascension pipe, near the mouthpiece, especially, but more or less throughout its length, occasionally even implicating the H pipe. There were many propositions to remedy these stoppages, and to do away with the hydraulic seal altogether. Of these, none would bear comparison, for safety and effectiveness, with the contrivance they aimed at displacing. The fault lay not in the hydraulic seal, but in the condition of its contents. The problem to be solved was how to keep the tar in the hydraulic main sufficiently fluid. The author found that an extra length of eight feet of ascension and dip-pipe, interposed between the retort and the hydraulic main, reduced the average temperature within the latter 30°. The deposit of pitch then ceased, and no further stoppages were experienced. There was little prospect of the intermittent process of carbonizing by manual labor being superseded by a continuous system actuated by steam-power. None of the suggestions with this aim had justified their adoption on a working scale. Even the modified advantage of substituting steam power for manual labor seemed difficult of realization. Of this last, a thorough trial at Beckton had ended in its being for the present abandoned. The form of the condenser was immaterial so long as it was extensive enough, and did not separate the tar and liquor until the desired minimum temperature was reached. This should be near that of the atmosphere, even in the depth of winter, to avoid condensation of naphthaline and loss of illuminating power in distribution. Of exhausters, the best, known as "Beale's," had a rotary action. The washer and scrubber were next considered. These removed the ammonia and such carbonic acid and sulphuretted hyerogen as would combine with the water and ammoniacal liquor used. Washers were generally shallow, oblong boxes, with cellular passages sealed by liquor or water, through which the gas was forced or drawn in fine streams; they gave a more intimate contact between the gas and the liquid than the scrubber, but were open to the objection that they caused back pressure. The scrubber, on the other hand, did not work well with small quantities of water, owing to the difficulty of insuring equal distribution throughout its contents as commonly arranged. The scrubber was usually a cylinder, sometimes of extreme height, filled with porous material, by means of which the gas was washed by ammoniacal liquor or by water; by these, and with reasonable care and entire exclusion of tar, fair results were obtained. The materials used in scrubbers were in themselves inert, and were subject to have their interstices filled by a deposit of tarry oil. The liquor was thus diverted, and established for itself distinct channels, the gas meanwhile taking separate routes through the mass of material, avoiding the contact desired. This defect was necessarily magnified in lofty scrubbers, where the liquor had to descend from 50 feet to 70 feet. For the removal of ammonia, and at the same time to procure liquor of great strength, the author preferred scrubbers on a principle somewhat like that of the Coffey still. They were boxes of iron 20 feet high; 10 feet long, and 2 feet wide internally, with longitudinal shelves of unwrought fir, 6 inches apart, extending alternately from one end of the box to within 6 inches of the other, so as to cause the water to traverse the whole length of one shelf before it descended to the next, meeting the gas flowing in a flat, wide current in the opposite direction. The washer or scrubber was an apparatus of great value, inasmuch as all purifying agents acted more energetically in a liquid form, and were cheaply and easily brought into contact with the gas without demarding manual labor.

The purifiers should be capable of holding such a bulk of material that its interstices might contain a

considerable volume of gas, and reduce the velocity with which the latter was passed in contact with it. The capacity should vary with the density of the purifying material. With either lime or oxide of iron, there was a sacrifice of economy whenever the capacity of the purifiers, at any one time acting on the gas, was less than four cubic feet per 1000 feet of gas purified per diem, and that so disposed that the aggregate depth of the material in lineal feet was not more than one-twentieth of the area in square feet. The author preferred to have on the outlet of each purifier to the clean gas main a valve sealed with fresh water. The great question of the day in purification was to remove the bisulphide of carbon. It had been ascertained at what when sufficiently long in contact with an alkaline sulphide, this impurity was reacted upon. If, therefore, caustic alkali was submitted to gas foul with sulphuretted hydrogen, but free from carbonic acid, a sulphide was obtained, which reacted on the bisulphide of carbon. In this condition, however, lay the difficulty. Although alkaline bases had a higher affinity for carbonic acid than for sulphuretted hydrogen, and were, therefore, capable of removing it preparatory to the process before indicated, their affinity for the latter body was considerable, and it was not easy to prevent sulphuretted hydrogen being arrested, so as to vitiate the formation of sufficient alkaline sulphide in the succeeding purifier for the extraction of the bisulphide. From this cause results of an apparently eccentric and conflicting character were occasionally obtained. Absolute purity from bisulphide of carbon had not yet been attained, but so far this body appeared to be capable of restraint within objectionable limits.

Gasholders with their tanks were a portion of the plant, which, next to retort houses, figured most prominently in a company's capital account, and therefore afforded the engineer scope for the exercise of economy in construction. The holders should be telescopic, developing a double storage capacity for the single expense in tank. The proportion of the height of the holder to its diameter should be regulated by the maximum amount of pressure required, subject to the value of the ground occupied. At the same time a height in each lift of less than one-fifth of the diameter was undesirable. Gasholders might be light in weight without sacrifice to their efficiency. The iron sheeting need not be thicker than No. 13 Birmingham wire gauge, weighing 4·38 lb. per square foot. The pressure of the gas within assisted in maintaining their shape; and the sides needed little framing beyond good top and bottom rings, where the guide rollers were attached, and a sufficient number of uprights to sustain the weight of the top sheets. No truss frame was required, as the sheeting might rest on a cheap scaffolding of wood when the holder was banded, and would be sufficiently sustained by the gas within when afloat. The author had frequently been inside gasholders inflated with air, and had noticed the trussing hanging from the distended sheeting of the top, being practically a burden instead of a support. However perfectly a roof framing might be adjusted, when the holder was lifted by internal pressure, its members remained rigid while the sheeting stretched, and never again fitted the framing. At ordinary rates of iron, gasholders of the kind described could be constructed, for sizes below a capacity of 300,000 cubic feet, at about £13 per 1000 cubic feet; above that size the cost diminished with the increase of capacity, until at 2,000,000 cubic feet £8 to £10 per 1000 cubic feet represented the cost. A holder for 2,350,000 cubic feet, which had a slight truss in the top, had been executed in 1866 for the Commercial Gas Company at so low a rate as £5 13s. per 1000 cubic feet. The external guide framing should be strong enough to sustain the inflated holder, even under the influence of a hurricane. At the same time, the constituent metal could be disposed in forms developing far more than was commonly seen, the strength due to the weight of iron composing its members. The author had been impressed by the elegance, and general fitness of the form to the purpose, exhibited by the guide framings of the original gasholders at the Bow Common Station of the Chartered Gas Company, designed by Mr. Croll, Assoc. Inst. C. E. Gasholder tanks had usually, where soil permitted, been built of either brick-work or masonry, well puddled round the walls and over the bottom. Portland cement concrete, in some cases without puddle, had been adopted latterly, notably by Mr. Livesey, M. Inst C. E. Brick tanks, puddled, ordinarily cost £6 10s. per 1000 cubic feet of capacity of the telescoped holder fitted in them, though the cost of the tank for the Commercial Company's holder was as low as £5 5s. per 1000 cubic feet. A concrete tank constructed by Mr. Livesey had been completed at a saving of £2 11s. per 1000 cubic feet, as compared with a brick tank of the same capacity.

The governor or regulator, as usually constructed, had a conical valve suspended in the upward stream of gas, actuated by a balanced gasholder, and was open to the objection that, having a flat base to the cone, the latter was disturbed and acted upon by the current of gas, much as a loosely fitting piston would be, and therefore required constant readjusting. To obviate this irregularity, a large throttle valve had been adapted for the purpose, which worked admirably. The ordinary pressure upon the system of mains ranged from between 1·0 inch and 1·5 inch head of water between sunset and midnight to 0·6 inch or 0 8 inch for the rest of the 24 hours. To secure economical distribution, the regulation of the pressure in the mains at all parts of the system should be under complete control; that pressure should be, as far as possible, uniform with the initial pressure, or under a constant rate of variation from it. These conditions were best fulfilled by distributing the gas from a mean level between the extremes, having high and low pressure mains for supplying the lower and higher portions of the district, right and left, avoiding all duplication in their course, and the consequent multiplication of joints and surfaces of metal.

In setting the proportions of length and diameter in the arterial and subsidiary mains, the experience of the qualified engineer would be the best guide. Mr. Hawksley, Past President Inst. C. E., had rendered invaluable service by investigating the laws which governed the transmission of aeriform fluids through cylindrical pipes, and by determining, from experiment on a practical scale, the co-efficient of friction for coal-gas. The author was satisfied that mains and services could be laid practically free from leakage. If the condition of mains and services as laid could be preserved, no doubt leakage would practically disappear. Unfortunately, however, mains, once laid, were subject to disturbing influences, such as decay of material, subsidence of the soil wherein the pipes reposed, and in large towns, the vibration due to heavy street traffic, as well as to contiguous railways. There was no satisfactory reason, however, for the high average percentage throughout the country. In the district of the Ratcliff Gas Company, which surrounded the docks, and was consequently subject to vibration from the heaviest traffic, the total percentage of unaccounted for gas, including other losses besides leakage, had, for two years, been within six per cent, ; and the returns from various parts of the country indicated improvement in this direction.

As an argument for the importance of cheap construction, it was pointed out, that the maximum demand for gas extended only for about three weeks in the year, falling at midsummer by as much as two-thirds. The anomalous and varying rates at which gas was sold, not only throughout the country, but even within the limits of London, was explained by the varying proportions between the quantity of gas manufactured in such case and the amount of capital employed. The difference in the charge to the consumer was absorbed in meeting the higher charge for dividend which the company with the larger proportion of capital required. This difference no concentration or amalgamation could overcome; and the lesson taught to the engineer should be the importance of endeavoring, so far as in him lay, to develop the highest efficiency from the works with the lowest expenditure of capital.—*Iron Age.*

On the Composition and Physiological Properties of Coal Tar Products.

By M. Dumas.

[Translated from the *Comptes Rendus* of the Academy of Sciences.]

Coal tar and the products resulting from the manufacture of gas having engaged the attention of a large number of persons who have been occupied in seeking for some suitable method of destroying the *Phylloxera*, it appeared to me that it would not be altogether useless to submit to careful analysis the volatile products of this tar, and to compare their physiological effects.

In the operations conducted with this object I have used tar extracted from the coal of Besseges, upon which the interesting experiments of M. Balbiana were made.

I shall not here enter into the details of my own analysis of the tar, its object being simply, by a first selection, to classify the several products into acids, alkalies, and neutral carburets more or less volatile. The following are the results:

Composition of tar extracted from Besseges coal.

	Per ct.
Acids or phenols	1·8
Alkaloids	2·5
Liquid oils obtained below 110° C.	1·5
Ditto do at from 110° to 120°..	1·0
Ditto do do 120 to 140 ..	1·5
Ditto do do 140 to 160 ..	1.4
Ditto do do 160 to 180 ..	1·2
Oil partly solid do 180 to 205 ..	1·7
Concrete products do 205 to 212 ..	3·6
Ditto do do 212 to 220 ..	5·8
Ditto do do 220 to 230 ..	3·6
Oil less solid do 230 to 240 .	4·4
Solid products do 240 to 270 ..	4·5
Ditto do do 270 to 290 ..	3 1
Ditto do do 290 to 330 ..	4·2
Ditto do do 330 to 350 ..	3·8
Oily Breeze	3·9
Dry Beeeze	42·2
Water and loss	8·3
	100·0

These results show that benzine existed in this tar in a smaller proportion than is generally found in these kinds of products; it was therefore necessary to seek elsewhere the specific properties attributed to it.

Neither the phenols nor the alkaloids contained in this tar furnished the required explanation. M. Rommier has already shown that although the alkaloids of tar possess the property of destroying insects, no special characteristic attaches to them in this respect, and I have satisfied myself that it is equally the case with the phenols of the tar now under consideration. I therefore instituted a series of experiments with the object of ascertaining the relative insecticidal powers of the more or less volatile hydrocarburets I had obtained from it.

I first of all mixed a portion of these several hydrocarburets with dry sand, each mixture containing 1 per cent. of solid or liquid hydrocarburet. I next placed in a flask, having a capacity of 100 cubic centimetres, a gramme of one of these mixtures, which I covered with a piece of cotton wool. I then introduced two or three moths, and closed the flask immediately.

All the volatile products of coal tar, characterized as neutral carburets, tested in this way, were found to be more or less rapidly destructive of insect life, as will be seen from the following table:

	Death ensued in
Liquid products boiling below 110° C.	5 min
Ditto " at from 110 to 120°.	5 to 7 "
Ditto " " 120 to 140 .	5 to10 "
Ditto " " 140 to 160 .	5 to10 "
Ditto " " 160 to 180 .	10 to15 "
Solid products rich in naphthaline at from 180° to 240° C.	65 or 75*"
Products boiling at from 240° to 270° C..	12 hours.
Ditto do do 270° to 359° C..	24 "

All these carburets, therefore even the less volatile

* In the first quarter of ot an hour, however, the insect was rendered quite motionless.

of them, have very powerful insecticidal properties. Those whose action is slowest are very decided in operation. It appears, therefore, that the tar I employed was characterized rather by the presence of naphthaline, or some other of the solid hydrocarburets, and the heavy oils of feeble tension, than by benzine or the light volatile oils.

It may even, perhaps, owe its more marked properties to the feeble volatility of these products, which, by allowing of their long retention in the soil, give them time to furnish the vapors necessary for the destruction of such *Phylloxera* as may have made their way for some distance into the ground. When benzine and volatile oils of a similar character have destroyed all the insects within range of their action, their force is spent, and they evaporate, while being destitute of the power of penetrating the soil to any great depth, they leave nothing behind them to protect the roots of the plants, which are consequently open to renewed attacks from the enemy from which they had been temporarily ridded.

The heavy oils, naphthaline, and the slightly volatile products of tar, do not, however, act in this rapid transitory, and purely local manner; on the contrary, their operation is slower and more extended, and their effect more durable; they are consequently altogether better suited for the performance of the double duty required of them—viz., the destruction of the insects actually present, and the preservation of the plants from fresh invasions.

It is well known that the heavy oils are now largely used by horticulturists for the destruction of insects; while naphthaline may be usefully employed as a substitute for camphor for the preservation of woollen stuffs, furs, and articles of a like nature.

It nevertheless appeared to me to be necessary, in this respect, to distinguish clearly the action of naphthaline from that of the carburetted oils accompanying it when it has not been very carefully purified. I therefore submitted to analysis several samples of naphthaline which I had myself previously prepared with very great care, for the purpose of determining the density of its vapor. When tried upon a few moths, it showed itself to possess properties that were decidedly destructive to insects, though somewhat slow in action, the moths remaining for a long time apparently in a state of stupor, but eventually succumbing to the overpowering effects of the poisonous vapor surrounding them.

Of course no one would have the presumption to declare that he had spoken the last word on so complex a subject as the analysis of coal tar, but the foregoing observations justify me in advising steady perseverance in the work of testing in various ways the heavy oils and solid crude carburets of tar mixed with sand or sawdust, more especially as these matters are known to possess insecticidal properties which have already been found in practice to be of great value; moreover, they are not injurious to the roots of the vine, and may be obtained in every gas-works.

It is only by multiplying and varying our experiments that we shall be able to ascertain whether there are actually in existence coal tars containing poisonous properties in variable proportions, and whether any particular combinations of these properties render them specially valuable as insect-destroying agents.

Education.—These are sensible remarks of the Hartford *Post:*

Thousands of children are sent out from the public schools every year with only a smattering of knowledge. They know some German, some algebra, a little chemistry, some astronomy, but not a thimbleful of learning which will ever prove valuable to them. If they had been made good readers and spellers, had been taught the correct use of the English language, and had learned the fundamental principles of arithmetic and geography, they would have had some tools with which to have gone to work in the world. As it is, they are crippled."

Gas Items.

Poor People.—The gas-consumers of Dumfries, Scotland, are in a loud state of dissatisfaction. Their (cannel) gas has actually run down to 26-candle power! Petroleum-gas, simon-pure, *might* suit them.

Mayor Wickham, Commissioner Porter and Comptroller Green met March 7, as the Gas Commission, and decided upon the form of the specification for proposals for lighting the city with gas for eight months from the coming 1st of May. The bids were opened April 5.

Underground Wires.—As we have before pointed out, this agitation to transfer the telegraph wires to subterranean pipes, has much interest for our city gas companies. An ordinance has been introduced into the New York Common Council, enforcing the change under a penalty of $25 a pole. At present writing our latest advices are from Albany, March 23, that the

"Telegraph companies failed to appear before the Committee on Cities to oppose the bill for placing the telegraph wires in underground tubing in cities. It is claimed by the supporters of the bill that this is done by them to gain time and push the bill to the end of the session. The committee are divided on the bill, the chairman, Mr. Daly, of New York, strongly favoring it, while Mr. Kirk, of New York, is opposed to legislating for New York alone. He is in favor of putting the wires underground in all the cities, which would defeat the bill, as none of the other cities want it."

Brooklyn.—From Albany, April 1st, we learned that

"The bill providing for the appointment of a gas meter inspector in Brooklyn and regulating the measurement of the illuminating power of gas in that city came up to-day, and in spite of its palpable violation of the Constitution prohibiting any inspection of merchandise, wrs reported favorably by the Committee of the Whole."

The sequel to the above we find reported April 7, as follows:

"The bill providing for a gas inspector in Brooklyn was lost to-day, on Mr. Alvord's pointing out the fact that it was evidently unconstitutional, by a vote of 50 to 43, the Assembly dividing without regard to party lines."

Further Albany Legislation.—Under date of April 9, we find that there was reported by the Committee on Trade and Manufactures, of the Assembly, a general law that no consumer can be compelled to pay for gas of less than 16-candle illuminating power, and the manufacturer furnishing it is liable to a fine of $100. Manufacturers are also required to allow interest at 7 per cent. on deposits, and the deposits are limited to $5.

On the same date, we find that an act was introduced by Mr. Kennedy, which will undoubtedly affect such of our gas companies, as, like the Manhattan and others, operate under the general manufacturing law; having thrown overboard special charters. It requires corporations for manufacturing, mining, and mechanical purposes to advertise the election of trustees, and provides for the minority representation of stockholders.

This bill was favorably reported. The Assembly has also passed a curious act making the bushel—dry measure—hold 40 quarts in all sales, by the bushel, of coal, ashes, marl, manure, Indian corn in the ear, fruits and roots of every kind, except potatoes, and for all other commodities commonly sold by heap measure.

We don't yet know whether this proposes to make 40 quart measures hold 32 or 32 hold 40.

Another most important bill has been introduced at Albany, by Mr. J. W. Miller, to reorganize the New York City Government, from which we learn that there is to be "a bureau of lamps and gas, the chief officer of which shall be called 'Superintendent of Lamps and Gas."

Another Petroleum-Gas Suit.—We clip from one of the daily papers the following:

"A suit has been commenced in the United States Circuit Court for the southern district of New York against the New York Mutual Gas-Light Company, by Dr. W. C. Wren, of Brooklyn, for infringement of patents for making gas from petroleum.

"It was given out at the time the Mutual Gas Co. started, that $1,000,000 were paid for the Gale-Rand patents. It is claimed by the plaintiff, backed by the opinion of some of the best patent lawyers in the country, that the Gale-Rand patents, and the way the Mutual Gas Co. are making their gas, is an infringement of Dr. Wren's patents. This promises to be a long and expensive litigation, as the Mutual Co. have plenty of money. And the plaintiff is also well backed. B. E. Valentine, of Brooklyn, the well known patent advocate, for plaintiff."

The above gives us occasion to introduce some facts that we gather from our exchanges, which we should put on record as current news, regarding the work which is doing in different parts of the country, in introducing petroleum as a gas material. The *National Oil Journal* had some months ago a letter from M. G. Cushing, of Tidioute, Pa., in which we are told that the oil-gas works there were built by Dr. Wren. He appears enthusiastic about their success, etc. Other statements are from G. W. F. Kirk, of Shelbyville, Indiana, who says that city was lighted last winter with gas from "one of Dr. Wren's patent retorts," and during the intense cold of January, no condensation occurred except in "four or five frozen services" which were "exposed in areas." This reads as if it arose from condensed moisture only. Also from J. H. Rollins, of Minneapolis, Minnesota, where it is cold enough to test condensability, in all conscience. He says, February 6, 1875:

"We sell gas at $4.50 and do not charge meter rent. We are using Dr. Wren's process for making gas from crude petroleum, but only as an enricher for our coal gas, and find it far more satisfactory than using cannel coal. The same process has been in use at Ashtabula, Ohio, for about two years, and I believe gives satisfaction. At Ashtabula they sell petroleum gas and use the dollar and cent dial on their meters. At Red Wing, Fairibault, and Stillwater, this State, they use a pure naphtha gas, and use the dollar and cent meter. In your list you quote Red Wing at $3, and Fairibault at $5 per M. The meters for the three places are the same, and adjusted at $15 per M. for the quality of gas they sell."

At Ashtabula, Ohio, they use the Wren retorts. As to the other Minnesota towns referred to, we do not know what method is used.

New Jersey Gas Matters.—The N. J. Legislature has adjourned, and in such hot haste and confusion that many measures, agitated, pending, and some supposed to be *faits accompli*, of direct or indirect interest to gas-circles have doubtless come to naught. Among our clippings are the following:

"March 29.—Mr. Doyle offered a bill providing that the Mayor of Newark shall nominate, and, with the consent of the Common Council, appoint a suitable person competent as a chemist, who is not a stockholder or an employee in any gas company in the county, to inspect all gas meters in the city, and to test the illuminating power, etc. His term of office shall be three years, at a salary of $1,500 per annum, which shall be paid by the gas companies in proportion to the amount of their stock."

The same day, we believe—

"Mr. D. Henry moved to recall from the Senate the gas meter bill for Paterson, which was agreed to. This bill provides for the appointment by the Mayor and Aldermen of an Inspector of Gas Meters in Paterson, who shall receive a salary of $1000 a year from the city treasury."

And on March 31:

"Mr. Henry's Paterson Gas Bill, providing that a chemist to test gas shall be appointed, was ordered to a third reading."

As to these two Newark and Paterson movements, private inquiry has resulted in an assurance from good authority, that no such measures passed.

The excruciating black-mailing scandal regarding the proposed new gas works at Union Hill, which we have only briefly alluded to—but which took up great space in the trans-Hudson press—died out, and with it probably the new gas-scheme itself, for this year; as we have seen no further mention of it.

Another very important measure, affecting all the gas companies in New Jersey, came up; but we have

not heard what the final conclusion was, and shall forbear till we do so hear.

MOUNT VERNON, WESTCHESTER CO.—The "East Chester Gas Light Co." at Mount Vernon contemplate the early erection of a new gas holder with a capacity of 35,000 cubic feet.

Another item irom the same vicinity is to the effect that at a meeting of Chester Hill Association it was decided to make arrangements with the East Chester Gas Company for laying down gas pipes throughout the whole of Chester Hill, and to adopt a uniform style of gas lamps for the streets. Mr. Crary stated that he had set apart two acres of land near the railway bridge at Second avenue, Mount Vernon, for a public park, all the papers and deeds for which he would hand over to the authorities whenever Chester Hill becomes an incorporated municipality.

Water-Supply Items.

STORAGE OF NEW-YORK-STATE WATERS.—T. N. Benedict, with N. B. Cooper, has made, under legislative authority, a report on the Adirondac plateau, and reports as follows:

1st. That immense quantities of water can be safely stored, at a comparatively low percentage of cost, on the upper Hudson, most of which is now worse than lost, as it runs to waste in spring freshets, which in various ways are the cause of much damage.

2d. That this excess alone is sufficient to maintain the d ficiency of the main river, at low summer stages, for 100 days, after liberal discount for losses on its passage. The lakes of the Racquette basin alone are alleged to have a capacity more than six times that of the Black River reservoirs, which supply the eastern division of the Erie Canal.

BROOKLYN.—The completion of Hempstead Reservoir has been authorized by the Assembly.

PATERSON.—In searching for the cause of the scarcity of water in the supply mains, a leak was discovered in the aqueduct near Danforth's works, by which a million gall ns daily was being lost. The break was repaired.

FREEZING OF WATER-PIPES.—On this subject, a writer in the *Scientific American* thus exhorts:

"The present severe winter, with its continued low temperature and severe frosts, has been a cause of much loss and damage to the systems of water-supply. Steam fire engines have been rendered helpless, and burning towns left to the mercies of the elements. A remedy might be found in laying an additional pipe under all mains and service pipes, through which steam could be injected a d the mains thus kept from freezing. The steam pipe sh uld be immediately under the water pipe, and it could be arranged with a branch terminating at each fire plug. The steam pipe should also be supplied with means of relieving the pipe from the water of condensation.

"The steam fire-engines could be arranged to force steam into the pipe to thaw out the mains and fire-plugs"

BROCKTON, MASS.—The following has reached us, from this town; which is both aqueous and gaseous in its interest:

"A curious phenomena attended the opening of the hydrant near the Protector engine house last Monday. For several days there had been no pumping at the mill, to allow investigation by the select men and engineers, and on Monday the pump was started again and hose attached to the hydrant above named, when a singular gurgling sound was heard which all present attributed to the passage of air from the water pipes through the hydrant into the hose. Upon disconnecting the latter and applying a lighted match to determine which way the air was passing, a blueish flame, nearly a foot in length, shot out of the opening, and at the same time there was plainly apparent an odor of gas. The flame was soon extinguished, and in a few minutes water began to run out, shortly filling the entire opening of the pipe. How the water pipe came to contain illuminating gas is the question now before the house."

HOLLY WATER WORKS, AT EAST SAGINAW, MICHIGAN.—These tests were made Jan. 10, 1874.

Steam pressure	Water pressure at works.	Pressure at hydrants.	Distance of hydrant from works.	Size of main.	Height.	Number of streams.	Size of nozzles.
Lbs.	Lbs.	Lbs.	Miles.	Inch.			Inch.
75	120	80	4	6	80	6	1
80	130	91	4	4	90	6	1
85	130	110	3	6	100	6	1
85	140	120	3	6	100	1	$1\frac{1}{2}$
88	135	120	3	4	125	6	$\left(\begin{matrix}31\\ 21\frac{1}{2}\\ 11\frac{1}{2}\end{matrix}\right.$
87	133	100	3	4	120	6	1
71	120	82	3	4	160	10	1

JERSEY CITY, F. S.—The Jersey City *Journal* fitly says:

"Nothing has been done this season, and nothing is likely to be done to improve the quality of our water supply. We hope that there will be nothir g the matter with the Passaic water next summer. There are few things worse than bad water for drinking and culinary uses. The recent epidemic fever in Seton Hall College, at Orange, which has resulted fatally in some cases, was caused by the bad quality of water supplied, the same as the sickness in St. Mary's Institute at Burlington, last fall."

In spite of this fact; that nothing is being done to avert from this city of near a hundred thousand, not to speak of the hundred and fifty thousand more of Newark, Hoboken, etc.; to avert the perils of drinking diluted sewage; a violent effort was nevertheless made by the Legislature now just happily defunct (nothing being left of it but a dreadful bad odor) to foist an iniquitous ring job on the people. The great *Boulevard* bill, fought over for years, providing for a ten-million.dollar esplanade on the top of the Palit sades, parallel to the Hudson, actnally passed; but i. is now reported that the governor refuses to sign it.

We regret to hear that John P. Culver, Esq., the accomplished engineer of the Jersey City Board of Public Works, who has now for many years had charge, among other public matters, of the water works, has resigned. The reason we have not yet learned; but trust that Mr. C. has succeeded to some other position worthy of his talents.

The Manufacture of Sulphate of Ammonia.

By DR. LETHEBY, of London.

Foremost of these operations which cause offence by the escape of sulphuretted hydrogen into the atmosphere is the manufacture of sulphate of ammonia from gas-liquor. This liquor is produced in great quantity at the gas works—varying from 10 to 40 gallons per ton of coals, according to the strength of the liquor and the perfection of the process for removing ammonia from gas. The strength of the liquor is estimated and expressed by its gravity in degrees of Twaddell, or by the number of ounces of strong sulphuric acid (sp. gr. 1850) required to saturate a gallon of it. This varies from 5 or 6 ounces per gallon to 25 ounces, and, according to my experience, the proportion of sulphuretted hydrogen contained in it ranges from 230 grains, or rather less than one-third of a cubic foot of sulphuretted hydrogen per gallon, to rather more than 1250 grains, or nearly two cubic feet per gallon; so that the liquor is exceedingly offensive from the quantity of sulphuretted hydrogen contained in it; and therefore it is necessary to store it in air-tight tanks, and to transport it from place to place in air-tight vessels—as barrels or tank-barges, or tank-trucks. It is proper also that the orifices which give exit to the air at the time of filling the tanks should be guarded with a box or small barrel containing hydrated oxide of iron, which absorbs the sulphuretted hydrogen, producing sulphide of iron, which is subsequently revivified by the action of the air.

The methods of treating this liquor with sulphuric acid so as to produce sulphate of ammonia have differed at different times and places. In my early experience, even in this metropolis, the process was to neutralize the liquor with brown acid of sp. gr. 1720, and to convey the evolved gases into a furnace fire, as their escape into the air would be dangerous to the workmen; and the saturated liquor still reeking with sulphuretted hydrogen was evaporated in open lead troughs over open fires. The nuisance arising from these operations was absolutely unbearable, and, as people got more and more sensitive of annoyance, the old process was discontinued. At the present time the practice is to evaporate or distil the liquor from closed boilers or chambers, and to convey the volatile products—ammonia, carbonic acid, and sulphuretted hydrogen—into a closed chamber or saturator, containing weak sulphuric acid, there being a contrivance for the escape of carbonic acid and sulphuretted hydrogen, and the conveyance of them to a furnace fire. In some cases the liquor is distilled from boilers set over a common fire; but, as this is liable to flushes and irregularity in working, it is objectionable, and has given place to the process of distilling by means of a steam coil set in the boiler, by which steam at from 20 to 30 pounds pressure is blown into the liquor. But the best contrivance of all is that known as Coffey's still, which consists of a vertical chamber from 20 to 25 feet in height, having a series of transverse septa which alternately leave openings at their ends. In this way, with about 60 of such septa, a superficial area of about 1000 square feet of evaporating surface may be obtained. The liquor is delivered in a constant and graduated stream at the top of the chamber, and, as it flows backwards and forwards in a descending current over the transverse septa, it meets with an ascending blast of steam, which is let into the bottom of the chamber at a pressure of from 15 to 30 lbs. In this way the volatile constituents of the liquor are carried over to the saturator, where the ammonia is arrested by sulphuric acid, and the exhausted liquor flows out in a continuous stream from the bottom of the chamber. The saturator is generally an air-tight leaden vessel, about 4 or 5 feet square and 3 or 4 feet deep, containing a charge of diluted sulphuric acid—equal parts of chamber acid (1600) and water. When the acid is saturated with ammonia, which is known by test-papers, steam alone is blown into it for about half an hour, to displace all traces of sulphuretted hydrogen, and the solution is drawn off into pans or troughs, where it is evaporated by means of a closed coil of high-pressure steam set in the solution.

Another kind of saturator occasionally in use is a leaden vessel divided into two compartments by a diaphragm or curtain, which descends below the liquid to within about 18 inches of the bottom. One of these compartments is closed air-tight and receives the volatile products of the still, where they meet with a graduated stream of brown acid (sp. gr. 1720) which continually neutralizes them, and forms crystals of sulphate of ammonia, which are constantly ladled out of the open compartment, The apparatus is ingenious, and saves much labor and time in evaporation, as the acid is used in its undiluted condition; but it is not so certain or satisfactory in its action as the closed saturator before described.

In both cases the uncondensed gases—sulphuretted hydrogen and carbonic acid—with much steam, are conveyed from the saturator through a 4-inch pipe to the furnace fire, where the sulphuretted hydrogen is burned. It is necessary, however, that the sulphuretted hydrogen should be deprived of its moisture before it reaches the fire, or it will extinguish it; and this is effected by throwing the pipe into coils, or otherwise cooling it. The precautions, therefore, to be taken in the conduct of this business are—

1. The transference and storage of the gas-liquor in air-tight tanks guarded with boxes of hydrated oxide of iron.

2. The distillation of the liquor in a steady and continuous manner in air-tight stills by means of high pressure steam.

3. The saturation of ammonia in close vessels, and

the complete expulsion of sulphuretted hydrogen from the saturated solution before it is drawn off for evaporation.

4. The condensation of moisture from the sulphuretted hydrogen evolved from the saturator, and the conveyance of the cold dry gas to the furnace fire where it is to be completely burned.

5. The treatment of the exhausted liquor from the still with cream of lime, so as to recover the residual ammonia by a second distillation; or, if the process be in operation at a gas works, the use of the residual ammonia as an absorbent in the purification of gas.

6. The observance of the greatest care as regards the tightness of all parts of the apparatus.—*London Journal of Gas-Lighting.*

Spontaneous Combustion at Steam Heat.

A correspondent (W. A. S.) sends a piece of charred wood taken from a plank which formed a portion of a box inclosing a steam pipe conveying steam at a pressure of about 80 lbs. per square inch. The wood is as completely charred as if it had been prepared by the ordinary process of burning. It is black, friable, and thoroughly deprived of all its volatile constituents.

This is a simple illustration of what occurs very frequently at temperatures exceeding 300° Fah. The moisture and volatile matters contained in woody fiber are driven off and carbon only is left, at temperatures exceeding 300°, the rapidity of the change increasing as temperatures rise. The precise lower limit of temperature of charring is not known; but when that above given is approached, the change occurs very slowly. As stated in a previous issue of the SCIENTIFIC AMERICAN, a piece of wood has been left in contact with a steam pipe conveying steam, during the cold season, at 50 lbs. pressure, for sixteen years, without exhibiting evidence of serious injury. The temperature there was about 205° Fah. Violette charred wood at 302° Fah., and the temperature of the steam which produced the carbonization referred to by our correspondent was about 325° Fah.

In order that combustion shall occur, it is evidently necessary, not only that the temperature shall be sufficiently high to increase the tendency to ignition, but that it must actually attain the temperature of ignition; and to produce spontaneous combustion in such cases, the temperatures of carbonization and ignition must coincide. In our issue of January 2, we showed, by the graphic representation of the law of decrease of temperature of ignition, with that of carbonization, that it was approximately expressed by a parabola, and that, unless some sudden change of law occurs at lower temperatures than those recorded, this coincidence cannot take place, and that, consequently, wet steam at ordinary pressures cannot ignite—although it may char—woods.

Our correspondent speaks of this piece as "almost burnt to charcoal." The expression and the idea represented by it are incorrect. Charring and burning are two quite distinct processes. The one is the expulsion of gaseous constituents from organic matter; the other is the rapid union of any combustible material with oxygen. It does not, by any means, follow fromthe fact that the wood is charred that there has been any oxidation or true "burning." Wood becomes charred in the process of burning, usually, merely because the oxygen seizes upon the volatile constituents first, and only takes the carbon when it may not choose between equally available molecules of the two classes of combustible substances. The slow process of carbonization illustrated by the example given by our correspondent, the more rapid process of charring in the usual methods of manufacture of charcoal, and the charring noticed when wood burns in the fire, are all identical, except as to time and completeness. Ignition and combustion are entirely independent processes, and we have no evidence which seems reliable, that the gases can take fire at temperatures lower than about 800° Fah., or that wood can ignite at less than 600° Fah. We do not think it impossible, or even improbable, that, under peculiar and rarely occurring circumstances, the condensation of inflammable gases within the pores of charcoal, which is a wonderful absorbent, or its saturation with readily oxidating materials, like the oils, may, by oxidation, be gradually accelerated in rapidity of action, and produce spontaneous ignition and combustion. We have, however, no knowledge of well authenticated instances even of this. Our correspondent will probably find it necessary to actually apply flame to his charcoal board to set it on fire. He will also notice that wood "smokes" before taking fire—an indication that the temperature of carbonization is probably lower than that of ignition.—*Scientific American.*

Thames Water.

On inquiry instituted by the Local Government Board into the quality of the water supplied by the Southwark and Vauxhall Company, some very important evidence was given by Mr. Jabez Hogg and Dr. Thudichum. What the company call water is supplied from the witches' cauldron of the Thames, no doubt purified to the best of their ability; but Mr. Hogg maintained that under the most improved system of filtration Thames water would still retain a very large amount of matter injurious to health. Of the samples subjected by Mr. Hogg to microscopical examination were all discolored, and showed evidence of the presence of animal and vegetable contamination. One is described as in a very active state of life, swarming with bacteria and other organisations, weak individually, but in the aggregate powerful enough to originate and spread deadly epidemics, such as the outbreak of the cholera in 1853–4, when three thousand people who used this water died. The softness of Thames water is also against it, as this quality enables it to decompose the leaden pipes, setting free poisonous compounds. Dr. Thudichum said there could be no doubt that the water above Teddington Lock was contaminated not only by known, but many unknown, channels, and that it would take fifty years to clear the water even if all contamination ceased. Not only so, but the same objections applied to the water higher up the river. Both gentlemen concurred in the opinion that deep-well water was infinitely superior to Thames water, however much filtered. In these wells the bacteria and other obnoxious creatures, which pass through the best of filters, do not exist, and the hardness of the water, which is a drawback for certain domestic purposes, can be easily removed; while, as long as it remains in the pipes, their corrosion is to a great extent prevented. The total discontinuance of drainage into our rivers, even if it were practicable, would not cure the evil; and it becomes more and more apparent that for drinking and cooking purposes at least, the source of supply must be sought away from surface contamination in the recesses of the rocky crust of the earth.—*Iron.*

Water and Gas in Cold Weather.

A Correspondent of a Louisville journal writes as follows:

The late cold season demonstrated the fact that there is something radically wrong in our dwellings as far as the conveniences of water and gas are concerned. The enormous expense and trouble connected with these two indispensable domestic agents are, we should suppose from remarks that come from housekeepers, a frequent source of annoyance that sorely tries Christian fortitude.

The question has often been put to the writer:

Why is it that people in Eastern cities are more fortunate in their experience with plumbing work, the seasons of cold, as a rule, being more severe and of longer duration? The answer is very simple. A long winter educates them into taking proper care of their conveniences. In the first place the architect in making the plan of a house is very careful about the locating of water fixtures, and seldom, if ever, will you find a bath-room or fixture in an exposed wall of the house: whereas we not unfrequently find a whole set of plumbing work over a back porch and only protected by a thin board partition from the weather, and very often with no means of shutting the water off when frost comes.

Another cause of trouble is that of relying too much on servants to control the pipes. A good, bad or indifferent plumbing job is a necessarily complicated piece of machinery requiring an amount of intelligence not possessed by the average "help" or ordinary house servant. Now, however humiliating it may be thought here for a lady in the absence of her husband to go down and shut off the water or learn how to do it, rest assured that it is not so considered in Eastern cities. With these causes of domestic mishaps before me, I write in the hope that that the following rules will be adopted by housekeepers:

1. When ordering a job of plumbing, it will not add to the expense to have every inch of pipe throughout the house with a fall to the stop cocks.

2. Never trust to wrapping or packing as a protection, because all packing materials will absorb moisture and consequently become, instead of a protection, a conductor of frost.

3. Never, as before pointed out, put or run pipes on the exterior walls of your house, and, in the fall look well to the closing of all openings in the cellar, as the boxing round the soil or waste pipe every often becomes a direct cold air-flue into your bath-room.

4. When you shut the water off, don't fail to go to every faucet and open it so as to give it vent and to allow the water in the pipes to fall out at the waste below.

Water conveniences are a luxury worth all they cost both for health and economy, and there is no honest plumber but would rather avoid the annoyance that jobbing creates than to do it, for he must be short-sighted indeed, if he cannot see the increase in business that would follow the benefits to the public which would result from better arranged and better understood work.

It would be well to suggest, before concluding, that, where circumstances will admit of its introduction, a hot air furnace, or steam apparatus, or even an anthracite heater will pay its own price in one winter, as by keeping the house comfortably warm there can be no chance of trouble.

Last, the suggestion I would make, but by no means the least, is that when you want a plumbing job done, get it executed carefully and well, if it does cost a little more than a cheap job. Money saved on this class of work is worse than wasted.

GAS.

How to keep this brightest of blessings from fluttering for a moment and then leaving us to wonder where our eyes are, is a question we are all interested in, and he cannot fail to be a public benefactor who will solve the problem and remedy the evil. The following suggestions I believe to be worthy of consideration:

I would advise that an inspector be appointed by the General Council to see that all pipes laid in houses are of a proper size and have a proper fall to a drip vessel near the meter in the cellar, so that the condensation from the gas may fall into this vessel before reaching the meter. Said drip or vessel should be made to contain from a pint to a gallon, or be even larger to suit the size of the building and the quantity of pipe to be drained. Then he should further see that our Honorable Gas Company gives us just what we pay for—fifteen, sixteen, or more candle power gas—and make a report through the public papers each month of the daily average. Further, the Gas Company should be compelled to lay pipes of sufficient calibre to supply consumers, as it would simply be an act of justice that they should. Many houses have been fitted up by irresponsible parties, who, in the absence of proper restraint, put in the smallest pipe in the market. The work appears to be good for

a year or two, or long enough to get it off their hands, and then the gas-fitters in general, and gas company in particular, get blessings by the score.

Finally, I would not advise any of our friends to sit up all night and moisten rags with hot water, without mixing the same with benzine, and then applying the bottle to his lips.

[Enigmatical, this last.—Ed.]

Expensive Nescience.

The following, from the London *Mining Journal*, should be read in America as well as in England:

"Where ignorance is bliss 'tis folly to be wise;' but consequences of ignorance in scientific matters' are not only disastrous, but also to be deplored the more, because of the waste of money, health, and time, which might with a willingness to take advice have been prevented. Every mining district abounds with abortive attempts at mining, some of which with the utmost judgment and intelligence were inevitable; others, however, could not possibly reach any other result. We have now more particularly in our minds the searches for coal, which had the explorers been content to learn the first principles of geology they would have known must only end in disappointment and loss. We select a few examples from Shropshire and North Wales. It is now some years since the good people of Llandinam, in Montgomeryshire, were induced by the presence of some dark-colored shales to sink for coal in Lower Silurian rocks of the Llandeilo range. The miners also had the good or bad luck to bring to grass specimens of the coal they had found; but, as these were smeared with fragments of bread and cheese, the inference was drawn that the coal had first of all gone down the shaft in the pockets of the men. Silurian fossils, which lie thousands of feet below the coal measures, were brought to the surface; but the attempt was persisted in long after it was shown to be useless and absurd.

A similar undertaking was subsequently started in the dark shales of the Bala group of rock near the town of Llanfyllin. A black stuff, which has since turned out to be phosphate of lime, was struck in the sinking of a well, and induced the belief that coal lay below. The promoters of this enterprise had the good sense to listen to the advice which told them that all search for coal so far below the coal measures and in such strata would be futile.

Much more determined and prolonged was an attempt made by a landed proprietor shortly afterwards to reach the coal measures in the Silurian shales near Buildwas Abbey, in the Severn valley. Silurian fossils were found in plently, much to the delight of the "collectors." It was shown that the Silurian rocks were here protruding through the coal measures, but in vain—still the money went down the shaft. We need hardly say that coal never came up.

The Millstone Grit, or Farewell Rock, has also had its share of riddling with shafts in search of coal. A notable instance occurred in the neighborhood of Oswestry. The Millstone Grit hill of Carneddau rises three miles to the west of that town, the coal measures resting on three sides of its slopes. A working collier, who had gone from the neighborhood, and by dint of hard work saved a little money in Staffordshire, dreamed one night that if he sank a shaft in a garden on the hill, which he knew as a boy, he would reach coal in 30 yards. Impressed with this belief himself, he filled others with his enthusiasm. Bed after bed of millstone grit was passed through spite of the usual warnings—houses, cows, pigs, etc., were sold to cover the cost, but all to no purpose. The old man also fell down the shaft; but he neither died of a broken neck nor a broken heart, but held to full faith in his unsuccessful enterprise.

A much less excusable mistake than the old man's is now being committed in the Llandeilo rocks of Llansilin, 6 miles west of Oswestry. Here also, as at Llandinam and Llanfyllin, the dark color of the shales has misled the adventurers. The outcrop of the coal measures is 6 miles to the east and the underlying Millstone Grit Mountain Limestone. The trap-rock and shales of the Bala and Llandeilo groups successively reach the surface before the Llansilin Colliery is reached. A small shaft has been sunk, and a bore-hole put down all in the dark shales, which lie at least 10,000 feet below the coal measures. What is more, a company has been formed, and a prospectus circulated, with the reports of "practical" men attached thereto. Warning after warning has been given, but each has been unheeded, or thought to proceed from interested motives. Surely the money, time, and anxiety which have been thrown away on this and similar undertakings should induce, at least, a pause for reflection in the minds of those who thus become infatuated with such enterprises. One could wish that such misdirected genius took a better turn.

The Pipe-Founding Trade in Glasgow.

At present there is a good deal of work in progress in the pipe-founding establishments in Glasgow, and more is looked forward to. Messrs. D. V. Stewart & Co., St. Rollox, and Messrs. Thomas Edington & Sons, of the Phœnix Foundry, are busily engaged on their joint contract for the Dundee Water Commissioners, and they have just commenced the execution of a large contract for Berlin—some 16,000 tons of water pipes, ranging from 36 inches in diameter downwards. The same two firms, acting conjointly, have recently secured a contract for about 10,000 tons of pipes for the Glasgow Corporation Water Commissioners. A number of these pipes are to be 48 inches in diameter, and are the largest that have been made in Glasgow for a number of years, during which time the special plant required in the production of such exceptionally large sizes has been lying perfectly useless. Messrs. Laidlaw & Son are engaged in a contract for the Airdrie and Coatbride Water Company, and a large contract for water pipes and pumping engines for the St. Petersburg water supply. Messrs. Thomas Allan & Sons, Springbank and North Woodside Iron works, have in progress a very large contract for gas pipes, embracing, it is reported, no fewer than 32,000 lengths, all of the same diameter.

Inquiries have lately been made regarding the price at which 36-inch pipes can be supplied for a track of thirty miles, in view it is believed, of some large town sewage schemes being projected. Within the last few weeks several of the Glasgow pipe-founders sent in tenders for a contract for some 1600 tons of water pipes for Canada, and the replies have been anxiously looked for during the last week or ten days. About five years ago the municipality of the ancient city of Ancona projected a water-supply scheme, and it was confidently believed at the time that a Glasgow firm would get the contract; but it has never yet been anything more than a project. Recently, however, a loan of £270,000 has been thrown into the financial market, a portion of which, it is expected, and fondly hoped, will be devoted to the consummation of the scheme. The Police Commissioners of Cupar, who are about to proceed to the construction of their new water works, are advertising for eleven miles of pipes with valves, fire-plugs, street wells, etc.; and the Edinburgh and District Water Trustees are advertising for tenders for the supply of about 260 tons of pipes, varying from three to six inches in diameter. It is very probable that both of these contracts will be secured by one or other of the Glasgow pipe-founding firms.—*Iron.*

Ludlow Valve Manufacturing Co.—The fire at the works of the Ludlow Valve Manufacruring Company, which partially destroyed the brass foundry and pattern house, did no damage to the main works. Many patterns were saved in perfect condition, and a large corps of pattern makers are replacing those destroyed. The works will continue to be run with full force, and having been run all through the winter, with the exception of a short time required for inventorying, and an unusually large stock having been accumulated preparatory to spring business, orders will be filled (with scarcely an exception) with usual promptness.

Foul Air in Schoolrooms.

Carbonic acid in schoolrooms, in some respects, bears similar relations to heat. Dangerous and fatal as it is known to be, when in great excess, its importance, *per se*, is unquestionably very much exaggerated. Naturally it exists in the atmosphere in variable proportions from 2 to 5 volumes in 10,000. But according to Dr. Angus Smith, no discomfort is experienced from the presence of carbonic in soda-water manufactories, when the amount is 2 volumes per 1,000, or more than ten times its normal proportion in the atmosphere. And Pettenkofer and Voit, in their experiments with this gas, experienced no discomfort from its presence, even to the extent of five times as much, or 10 volumes per 1,000. Notwithstanding, *respired* air, containing only 1·5 volumes of carbonic acid per 1,000, is well known to cause headache, vertigo, and other painful admonitions of danger. And experience abundantly proves that whenever respired air, or the air of occupied apartments, is found to contain of carbonic acid more than 1 volume per 1,000, such an atmosphere is dangerous to health. It is apparent, therefore, that the ill effects of air which contains only a little more than 1 volume per 1,000 of carbonic acid, are due to other and more potent poisons. Such air not only contains, besides the excess of carbonic acid, and not unfrequently the more deadly carbonic oxide, de d and decomposing animal matter, and other mephitic gases and exhalations, but it is deficient in its very first life-sustaining property, oxygen.

The average amount of oxygen consumed by a healthy person is half a cubic inch every respiration, which in a day amounts to upwards of 25 cubic feet. And as oxygen constitutes but one-fifth of the volume of the air, a single indi idual renders not less than 125 cubic feet of air unfit for respiration, every 24 hours, by the mere abstraction of oxygen alone. Meanwhile, there is exhaled by the lungs about 15 cubic feet of carbonic acid, 30 ounces of watery vapor, and an indefinite amount of organic matter, which has been variously estimated at from 10 to 240 grains.

The whole quantity of air actually respired in 24 hours by a healthy person is about 400 cubic feet. This contains, when once passed through the lungs, about five and a-half per cent. of carbonic acid. The proportion of watery vapor depends upon circumstances; as a rule, as much as necessary to saturate it at the temperature of the body: consequently, the amount varies in the inverse proportion of the quantity of moisture the air contained before it was respired. It may be estimated at about 200 cubic feet per hour. 1,000 parts of vapor exhaled from the lungs consists of pure water, 907 parts; carbonic acid, 90 parts, and animal matter, 3 parts. In addition to these, it is well-known that other substances introduced into the circulation may be thrown off from the system and increase the danger.—Dr. Bell, in the *Sanitarian.*

[To the passage in the above in which it is intimated that *carbonic oxide* is among the effete products o human respiration, we must demur.—Ed.]

Doubtful Value of Foreign Patents.

A very near relative of ours has lately been travelling through Europe for the purpose of introducing a beautiful invention which he had patented in the United States, England, France, Austria, and some of the German States. He now writes as follows:

"Strange to relate, in all the countries where I had secured my invention by patent, I had hard work to make my profits meet my expenses, which were enormous, considering that I had to employ an agent and interpreter; while in countries where I had no patent, I made my pile. The reason is not very difficult to understand, namely, it is a simple transaction to sell a secret process when its value can be

[*For continuation see page.* 160)

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FRIDAY, APRIL 16, 1875.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER, The registration fee has been reduced to eight cents, and the registration system has been found by the postal authorities to be actually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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[CIRCULAR.]

AMERICAN GAS-LIGHT ASSOCIATION.

The second Semi-Annual Meeting of the Association is to be held in Washington city, on the 12th of next month (May).

To appreciate the benefits, both present and prospective, to be derived by the manufacturers of illuminating gas, resulting from the formation and continuance of this Association, those interested have only to examine the first volume of its proceedings, just issued.

This volume gives the history and doings of the Association, from its inception to the present time; and contains discussions upon Naphtha Gas, Naphthaline, Purification, Sunday-Labor, and various other topics; some of which, in this day of investigation and improvement are fast becoming of vital interest to the manufacturers of illuminating gas—vital in this, that each and all must learn the best known processes in use for the producing, purifying and distributing, of their manufactured product, or be outstripped in the race by those who will learn, know, and do these things. The great public, our patrons in the consumption of gas, already demand that we shall qualify ourselves so as to be masters of our business "to the end that the cost of gas may be cheapened, and its consumption increased"; and if we fail in this, will they not soon, in imperative tones, demand that we shall "step down and out," and leave our places to others, who have made themselves more competent.

Gen. Roome, our worthy President, at the last meeting of the Association stated that he commenced his profession thirty seven years ago, that—"Gas was then sold in this city for $10 per thousand cubic feet. We make more money at $2.75 per thousand cubic feet than we made at $10. Why is this? Because of improvements in our manufacture."

We respectfully invite all manufacturers of illuminating gas, in the United States and the Canadas, to become members of the Association, and if possible attend its meetings; and thus, in an economic way, by a united effort, and "a long pull, a strong pull and a pull altogether," roll on the ball of improvement.

N. B.—Excursion tickets from New York to Washington and return my be had for $10 (a reduction of 33 per cent.) by applying to the Secretary.

The mention of Mr. McIlhenny's name in my communication published in the last issue, in relation to the next meeting of the Association, to be held in Washington City, was made of course without his knowledge.

April 12. CHARLES NETTLETON,
Sec. American Gas-Light Asociation.

GAS-LIGHT ASSOCIATIONS IN AMERICA.

We certainly may congratulate the Gas Profession on this Continent upon the changes that have been brought around by Time's whirligig, during the fifteenth lustrum of the nineteenth century, which closes with the year 1875. It was during the first year of this period, 1870, under date of Oct. 17, that we made a first earnest appeal to the American Gas Profession to *organize*. Our readers will, we believe, excuse us for reciting here this appeal, which has been so fully answered. The paragraphs we now quote were written in an editorial reference to a then recent meeting of the British Association of Gas Engineers—

"We shall here make an appeal to our American Gas Public, whose future lies before them so bright and so full of promise. How much longer are we to remain without any general or national organization, without any means of intercommunicating or disseminating the numerous new and important observations we make, and of discussing, in general convention, subjects which pertain to the general weal of our fraternity? When shall our future American Association of Gas Managers take root, and spring up, to ramify and overspread this Continent, so soon to be the seat of a civilzation more fruitful and of a nation mightier than the world has yet seen; a Continent whose endowment by nature is so unparalleled, and into whose lap the energy of the human race is now continually pouring and concentrating? In the solution of this question we have not heretofore been idle, and can clearly claim to have so far done our part, so far as in us lies. It is but two or three years since we spent much labor and space, and shed much ink, in endeavoring to initiate this great movement. Out of our proposed National Convention of Gas Engineers would, without doubt, have germinated such an Association as that we now foreshadow. We may truly say to our American gas men: "We have piped to you and ye have not danced."

"Nevertheless we deem it our duty to continue to set before our gas fraternity the importance, nay the necessity, to the establishment of their true status in the general community, and the maintenance of the position and influence to which they are justly entitled and which they ought, *if only in their own defence*, to occupy; of *organization*, of union of force and purpose, and of opportunities of periodical meeting for common interchange of experience and joint deliberation. Union is strength."

These paragraphs were signed with the full name of the present Editor of this Journal, thus imposing upon him the whole responsibility, of what doubtless seemed then to many, both in and out of the profession, as unpractical, chimerical and visionary, if not altogether unreasonable, suggestions. Our recollection fully serves us to add, however, that the Proprietor and Editor at that time, Mr. Callender, was fully and heartily in accord with these views, though not feeling a high degree of encouragement as to their accomplishment. Our lamented friend scarce lived long enough to learn of the first step that was taken in pursuance of the above counsels. He was on his death bed when, on the 2d of February, 1871—at the funeral of another "torch too early quenched" of the profession, Mayor Blake of Worcester—the New England Association of Gas Engineers was organized. It was not, however, till April 1873, that our National Organization, now the American Gas-Light Association, was established.

Within the last six months, we have presented in these columns Reports of the Proceedings of Annual meetings of these two Associations, which we hold to justify every anticipation presented in the extract given above.

It must now be plain to every one, from actual observation, that these Associations furnish the true method and medium of intercommunication of new and important observations, and of "discussing subjects pertaining to the general weal." As "two heads are better than one" so two hundred heads, which we shall soon see together at these gatherings, will be better than two. It will soon appear likewise, if it have not already, that the true status and true function, in and towards the public, of the gas-profession and of gas-producers, will be defined and made manifest through these Associations; and this in ways which will carry authority and conviction. "Union of force and purpose" will quickly manifest itself as strength and influence; and "interchange of experience" and of faith founded thereon, will eliminate erroneous views, and promote confidence, on all hands.

Among many other purposes possibly of a minor degree, served by these Associations, is one not heretofore enlarged on; the making known to our contemporaries in other civilized countries, not merely the fact that our American

towns are lighted by gas—which might be new to few—but, in addition to this, special and personal knowledge of our own working men in the gas profession is broadly disseminated throughout the world, in a way the results of which will hereafter be found very gratifying. The Proceedings of these Associations are quoted, as carrying authority, by all the European Technical Journals, whether specially devoted to gas or other arts.

Before us lies the complete publication, in very handsome pamphlet form, of the Proceedings of the American Gas-Light Association up to and including the last October meeting. Those who have not yet become members may obtain copies from the Secretary, Mr. Nettleton, 117 Broadway, New York City.

A NEW WATER-GAS ENTERPRISE.

We are enabled to announce to our readers that the manufacture of gas through the decomposition of steam by incandescent carbon, according to patented methods of Monsieur Tessie du Motay, of France, is about to be carried on, on a large working scale, in this city.

The Company is known as the Municipal Oxygen Gas Company, and is under the Presidency of R. M. C. Graham, Esq. Their works are located in Forty-First street, between Tenth and Eleventh Avenues. They have decided to erect furnaces at once, and to lay mains for the manufacture and distribution of from four to five hundred thousand feet of this gas, enriched with naphtha, for illuminating purposes. The cost of the production, in this way, of a gas of good calorific power, we have every reason to believe, from information in our possession, will be very low indeed; and the prospect seems good therefore that gas may soon be furnished in New York City for warming houses and cooking food, as well as for many manufacturing uses, cheaply enough to inaugurate a new era of civilization—an era which we have long hoped for and looked forward to. Any party working to promote, in a really *practical* way, the coming of this era, will always have our good word and our good wishes.

NEW OIL-FIELDS.

About a couple of months since, in announcing the startling discovery of flowing oil wells within the limits of the State of New York, we took the liberty to predict that those who hug themselves about the oil-fields being soon "played out," were very likely to be brought to confusion by still further productive districts being from time to time discovered. We did not expect so speedy a verification, as that at Warren, Pa.; which just one month since so surprised the country again.

If the view we threw out, Feb. 2, however, regarding the oil at Carrollton, in New York; that it may belong to a great prolongation of the Tidioute belt; as Warren lies about half way between, and almost in a direct line between, Tidioute and Carrollton; it may be that this latest new development, on the Beatly Farm at Warren, is not strictly that of a new oil-field, but only confirms the existence of an expansion of some 200 square miles or more of unexplored oil territory.

We say again that we think the sooner the idea is abandoned, with all the deductions that may have been drawn from it, that petroleum is an ephemeral thing; the better it will be for all concerned. It is going to last out our day and generation, with but little fluctuation in price. This being admitted, the next question is: What are we going to do about it? "Students lamps" are excellent and *very cheap* substitutes for gas; indeed so excellent, that many now far prefer them. Still, they do not represent the acme of advancement in burning petroleum; and improvements will arise which will yet add great elements of perfection, cheapness, convenience and safety to petroleum-lamps. Are we *looking this crisis in the face*, and taking energetic measures to avert it? These measures are not difficult to point to; but enough already for this present writing, intended only to be suggestive.

PROF. SILLIMAN'S AMMONIA-PATENT

It was our intention, in our issue of Feb. 16, in which the specification of this patent was given in full, to have entered into some discussion of the important general topic of ammonia-saving; but this intention having been frustrated (by illness), we shall take a future occasion now to dwell upon this large subject, in all its aspects.

From correspondence with Professor S. we learn that with reference to the cyanogen compounds present in the crude gas, he has found that the "salt-cake" contains sufficient *iron* to arrest all these, as he has determined by repeated analyses.

PATENT FOR SALE.

To Fire Clay Retort Manufacturers.

W. D. CLIFF, of the firm of JOSEPH CLIFF & SON, Wortley, Leeds, England, has recently obtained Letters Patent for the making of CLAY RETORTS by machinery. Besides being made cheaper, they are also made much better than by hand. They are regular and equal in their thickness, and in their length are true and straight throughout, being in all respects far better and handsomer than hand made Retorts. The fact that Messrs. Cliff & Son have for many years been very largely engaged in the making of Clay Retorts will be a sufficient guarantee as to value of the patents. The patentee is wishful to sell the patent right for America. It is No. 155,069, and is for seventeen years from the 15th day of September, 1874.

All particulars may be learned on application to

W. D. CLIFF,
Wortley, near Leeds, England.

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NOTICE.

AMER. GAS-LIGHT ASSOCIATION.

OFFICE OF THE AMERICAN GAS-LIGHT ASSOCIATION,
No. 117 BROADWAY, NEW YORK CITY.

THE **SECOND SEMI-ANNUAL MEETING** of the ASSOCIATION will be held at **WASHINGTON CITY, D. C., May 12, 1875, at 10 A. M.**

Headquarters, WILLARD'S HOTEL.

CHARLES NETTLETON, Secretary.

TO GAS COMPANIES, AND CITY GOVERNMENTS.

DYOTT'S PATENT CHAMPION STREET LAMP

Doubles the Light with the same quantity of Gas used in other Lanterns. *All others* waste half their light, illuminating the sky, or if the top is of metal, absorb it.

SINGLE TOP GLASS LAMPS BOTH GLOBULAR AND SQUARE become heated if a good light is put in them, and rain, hail or snow falling upon the HEATED GLASS BREAKS IT. When one glass is broken the wind will either blow the flame against the others and break them, or destroy the entire Lamp. *Nine-tenths of the breakage and cost of repairs of other* street lamps is owing to that cause.

DYOTT'S "CHAMPION" is the only DOUBLE TOP—the only Lamp that has the Opaline White Dome, which is a *never changing reflector;* it doubles the power of, and throws the light to a greater distance. It is also a perfect *protector*, shielding the heated top of the lamp from all inclemency of the weather. The white dome is kept cool by the passage of air between it and the transparent globe below. Rain, hail or snow will never break either the globe or dome. The globe rests upon rubber cushions, and is supported laterally by elastic springs, so that contraction or expansion of the globe, or jarring of the post will not break it. They can be cleaned in one-fourth the time required to clean other lanterns. The metallic portions are of iron, copper and brass, and are the most durable, economical, efficient and cheapest lamps in existence. For public buildings, and wherever an ornamental and powerful light is required, they are made in CLUSTERS of 2, 3, 4, 5, 6, 7 and 10 lamps, which have no equal in this or any other country for *beauty, durability, efficiency* and economy, either in cost, use or ornamentation. Designs furnished when requested for specific purposes. Gas companies, or those who have the lighting of Cities in charge, are solicited to communicate with us in reference to the agency for its introduction.

The Franklin Institute has awarded our CHAMPION LAMP the highest premium: (they give a silver medal) and its Committee on Science and the Arts has recommended it as the best lamp in use. It has also invariably taken the highest premium at every Exhibition at which it has been presented, and elicits the strongest commendations wherever it is used. We have several new and handsome patterns of POSTS for Corporations, Parks, public and private use, also for clusters of lamps, that are not excelled in beauty or price at which they are furnished.

DYOTT MANUFACTURING CO.,
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374-6meot

MECHANICAL & GAS ENGINEER.

To Gas-Light Co's.

The undersigned respectfully announces his voluntary resignation of the Vice-Presidency of the American Meter Company from the 1st of March last, after filling that position from its organization in 1863, and now offers his services as

Consulting or Constructing Engineer,

in the erection of new, or the extension of Gas Works.

He is prepared to furnish plans and Specifications, embracing all the latest improvements in the MANUFACTURE OF COAL GAS, at short notice, and on reasonable terms. His experience of THIRTY YEARS in the construction of Gas and Water Works, Railroads, Tunneling, etc., enables him to refer with confidence to any of the Works erected by him, as a guarantee of satisfaction and ability.

By arrangements with reliable manufacturers of all MATERIAL and SUPPLIES used by Gas Companies, he is prepared to furnish promptly all such orders, with best selections, and to give satisfaction as to prices, terms, etc., and respectfully solicits a share of patronage.

HENRY CARTWRIGHT, Gas Engineer,
2107 GREEN STREET, PHILADELPHIA. 379-6t

made evident from a practical demonstration; but to sell a patented process is a very different affair. The purchaser wants to secure the protection of the patent he buys, and this requires a native lawyer and a considerable amount of pow pow."

He states that he made more money in Turkey and Russia than elsewhere, simply because before leaving the United States he did not think of taking out patents in those countries, not intending to visit them; but once *en route* after leaving Vienna, he visited Poland, Bohemia, Hungary, Turkey, Asia Minor, and travelled through Russia from the Black Sea to St. Petersburg.

A stronger objection to patents became evident in France; while travelling in Russia, his Paris agent neglected to pay the yearly contribution required by the French law to keep the patent in force; it was therefore annulled and became public property, and now those to whom he sold the right to work his patent process are suing him for damages—one of them obtaining recently a judgment against him for 1,000 francs, and costs.

Comment is unnecessary; let those who imagine in regard to a foreign patent that "there's millions in it," think before they leap. They should, above all things, remember that a foreign patent is not *prima facie* evidence that the invention has some value more or less, either in regard to novelty or usefulness, as is the case with a United States patent; nor does such a foreign patent secure the protection afforded by one in this country. The difference is that foreign patents cost much more, and that most of them consist only in a mere registering of the name of the inventor, with a very abridged description of the invention.

The money thrown away yearly by American inventors to secure patent rights in Europe is something enormous, and constitutes a voluntary tax that we pay toward European governments. However we must in justice acknowledge that there are a few cases where such patents have been profitable, but they are like angels' visits, few and far between.—*Manuf. and Builder.*

Urban Concentration.—There is a tendency of transportation to send population to cities. As facilities for transportation increase, the world shrivels in size, and there is a tendency to bring capital and men into centers of trade. In forty years England has increased in population 51 per cent., while in large cities population has increased 123 per cent. In the United States fifty large cities within the past thirty years have enlarged seven-fold, while the country at large, including the cities, has increased three-fold only. This has an important moral significance. It is one of the great tendencies of our civilization which we must foresee and provide for. We must take a moral as well as a financial hold of these great centers. Again, commerce is held and has been by free States; it is also the natural ally of science and literature. They created commerce, and commerce to a great extent created them. Men of trade owe everything to men of ideas, and the capacities of commerce to-day owe more to science than any other branch of human interest, and must continue to do so. Far be the day then when the money power of our land should be divorced from its intellectual power. No clear-headed business man would overlook this fundamental connection. Science and literature and commercial prosperity have ever gone hand in hand. —*Lecture of President Anderson of Rochester.*

A Reading, Pa., exchange says: The charcoal furnaces throughout the State have been reduced in numbers for the past years and changed to anthracite. The following are still in the counties named: Cumberland 5; Huntingdon, 4; Berks, 5; Adams, 2; Franklin, 4; Lawrence, 2; Lebanon, 1; Centre, 4; Mifflin, 1; Blair, 3; Carbon, 1; Bedford, 1; Chester, 1; Perry, 1; Schuylkill, 1; Clarion, 1; Dauphin, 1; Lancaster, 1; Fayette, 1; Clinton, 1; York, 1. Total 42.

GAS! GAS! GAS!

To all Whom it May Concern or in any wise Come.

I have a Mine of Oxide of Iron, Manganese, Cobalt and Lime used in Purifying Coal Gas, Having been used by the New York Mutual Gas-Light Company for over a year, at a great saving of expense, and known to the New York Board of Health as PARHAMS MIXTURE FOR PURIFYING COAL-GAS.

Any information will be given by S. P. PARHAM, Chief Engineer of N. Y. Mutual Gas-Light Co., Eleventh street, East River, or by DANIEL PITTINGER, Washington, Warren county, N. J. 379-2t

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Expert in Patent Cases.

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Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa. 10
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, Burlington, N. J. 8
Franklin Foundry and Pipe Works—Jas. Marshall & Co., 23 Nineteenth street, Pittsburgh, Pa. 9
Gas Valves (Chapman) 75 and 77 Kilby St., Boston, Mass. 3
Gas-Burners—C. Gefrorer, 259 Commerce street, Phila., Pa 9
Gas Purification—St. John and Cartwright. 5
Gaylord Iron and Pipe Company—90 and 92 Broadway, Cincinnati, Ohio. 9
Gas Meters, etc.—Harris, Griffin & Co., 12th and Brown streets, Phila., Pa. 10
Gas Meters, etc.—Wm. W. Goodwin & Company, 1012 Filbert street, Phila, Pa. 12
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa. 11
Gas Fixtures, Etc.—Archer & Pancoast Manufacturing Co. 67 Greene Street, above Broome, N. Y. 2
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway. 7
Gasholders, Etc.—Delly & Fowler, 39 Laurel st., Phila., Pa. 4
Gas and Water Pipes—B. S. Benson & Son, 68 B'way., N Y
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia. 2
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass. 4
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J. 8
Lime Hurdles.—Manhattan Lime Hurdle Co., Geo. W. Day, Treas., No. 3 Railroad Square, Haverhill, Mass. 2
Lava Tips and Scotch Tips—Charles H. Meyer & Co., 227 Chestnut street, Phil. Pa. 8
National Tube Works Co., 78 William St., N. Y. 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y. 4
Patent Gas Exhauster—Smith & Sayre, 95 Liberty sttreet. 4

GAS COALS.

Cannelton Coal Co. of West Virginia—J. Tatnall Lea, 325 Chestnut street, Phila, Pa. 3
Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., New York. 7
Gas Coals—Bird, Perkins & Job, 27 South st., N. Y. 7
Monongahela Gas Coal—56 Exchange Place, Baltimore, Md. 6
New York and Cleveland Gas Coal Company—384 Penn Avenue, Pittsburgh, Pa. 6
Ohio Gas Cannel—G. Merryweather, Pine cor. Wm. sts.
Peytona Cannel Coal—S. E. Low, 58 Broadway, N. Y. 5
New York. 1
Red Bank Mining Company—Bird, Perkins & Job, 27 South st., N Y. 7
Sterling Coal—Freeman Butts, Cleveland, Ohio. 6
The Newburg Orrel Coal Co.—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7. 6
Tyrconnell Gas Coal—52 S. Gay Street, Baltimore, Md. 6

FOUNDRIES.

Atlantic Dock Iron Works—John P. Kennedy, Office 98 Liberty street, N. Y., P. O. Box 2348.
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md.
Continental Works—T. F. Rowland, Greenpoint. 6
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons 3
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa. 4
Mill Street Foundry.—Geo. Stacey & Co., Cincinnati O. 5
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa. 6
Pascal Iron Works—Morris, Taskar & Co., Philadelphia. 12
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent. 3

WATER METERS, PUMPS, ETC.

Cast Iron Pipes for Water and Gas—Riley A. Brick, 112 Leonard street, N. Y. 10
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 940 River street, Troy, N. Y. 6
Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila. 7

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, etc., 58 Goerck st., New York. 8
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 916 Market street, St. Louis, Mo.
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene, Essex and Bergen sts., Morris Canal Basin, N. J. 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila. 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md. 1

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal. 9

MISCELLANEOUS.

Analysis and Testing of Gas Coals—Prof. Henry Wurtz, 12 Hudson Torrace, Hoboken, N. J. 10
Architect and General Gas Engineer—William Farmer, 111 Broadway Room 95. 5
American Gas Works Construction and Supply Company—61 Broadway, N. Y. 3
Cements—S. L. Merchant & Company, 76 South st., N. Y.
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind. 2
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York. 10
Gas Engineer—B. E. Cholla, 914 Olive St., St. Louis, Mo. 6
Gear Wheels—Scott, 98 Chambers St., N. Y. 5
Gas-Light Company of America, 63 and 64 Drexel Building, New York. 2
Kidd's Gas Consumers Guide—A. M. Callender & Co., 42 Pine Street, N. Y.
Massachusetts Institute of Technology—Samuel Kneeland Boston, Mass.
National Coal Gas Company—H. P. Allen, 4 Warren street New York. 6
Retort Setting and Working—E. S. Cathels, Montreal, Can. 8
School of Mines, Columbia College, East 49th st. 9
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J. 7
Scientific and Practical Chemist and Geologist—Profetsor Henry Wurtz, 12 Hudson Terrace, N. J.
Screening Shovels—G. W. Dean, 1358 Broadway, N. Y.
Springfield Gas Machine—Corner Canal and Centre St.
Slade's Automatic Fire Governor—Jas. Slade, Gas Works, Yonkers, N. Y.
Scotch Fire Brick—S. L. Merchant & Co., 76 South Street, corner Maiden Lane, N. Y.
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y. 9

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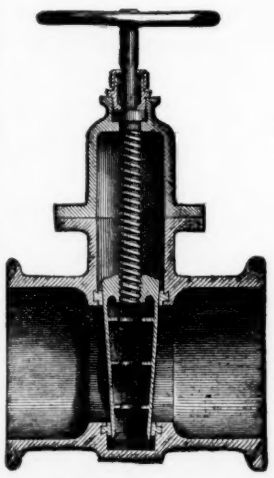

These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

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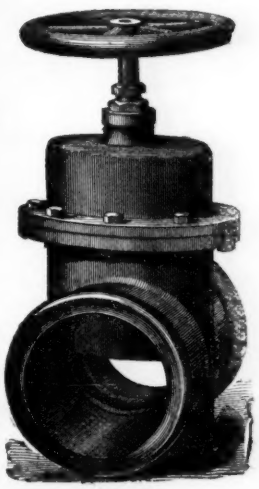

We refer to the following named Gas-Light Companies among the many that have used these Valves:

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CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WILLIAMSBURGH, N. Y

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.

STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

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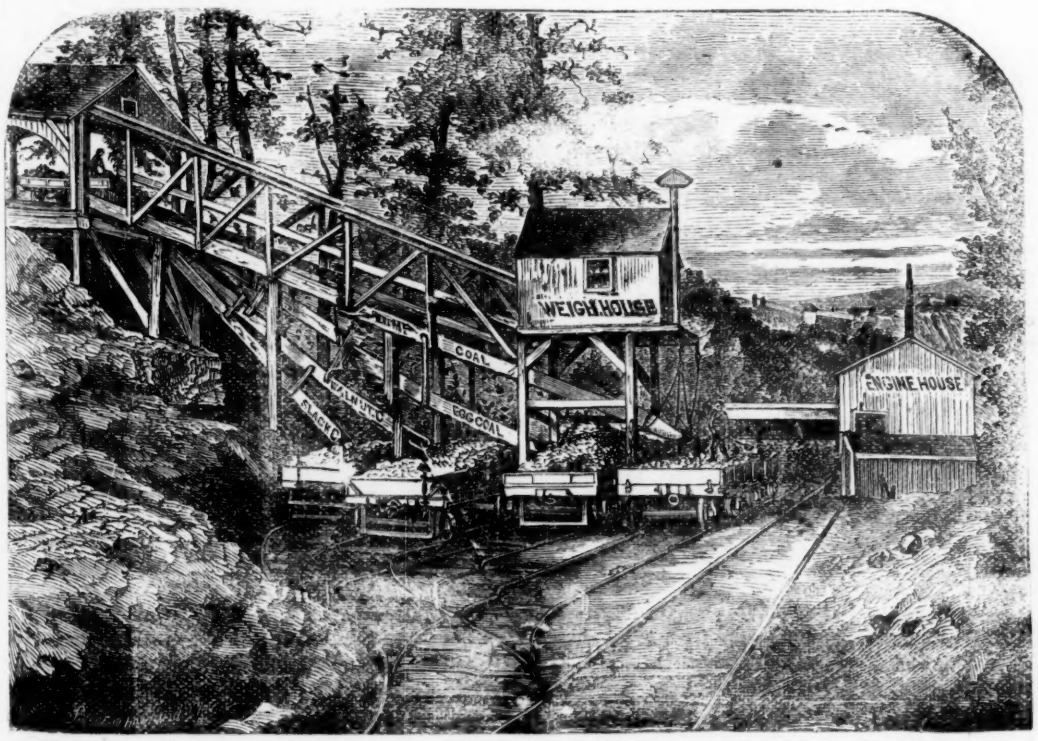
(LIMITED.)

CLEVELAND, OHIO.

CELEBRATED GENUINE STERLING COAL.

American Cannel. Pittsburg and other Gas Coals.



Testimonials.

From Manhattan Gas-Light Co., N. Y.

Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactory—averaging 9,500 cubic feet of 15 candle gas per ton of 2,240 lbs., and 41 bushels of coke weighing 1465 lbs. We consider it among the best American Gas Coals for the quantity and quality of the gas produced, and also for the excellent quality of the coke.

I am, gentlemen, your obedient servant,
CHARLES ROOME, Pres't.

From Buffalo Gas-Light Co., Buffalo, N. Y.

The Sterling Coal we have had from you we find to be an excellent gas coal. The yield of both gas and coke is good. The illuminating power of the gas is high and the quality of the coke is very good.

ROBERT ROBSON, Foreman Gas Works.

From Citizens Gas-Light Co.

ROCHESTER, N. Y., Sept. 2, 1874.

Your favor September 2nd at hand. Yield of Sterling Coal to date from July 19, 4·70.

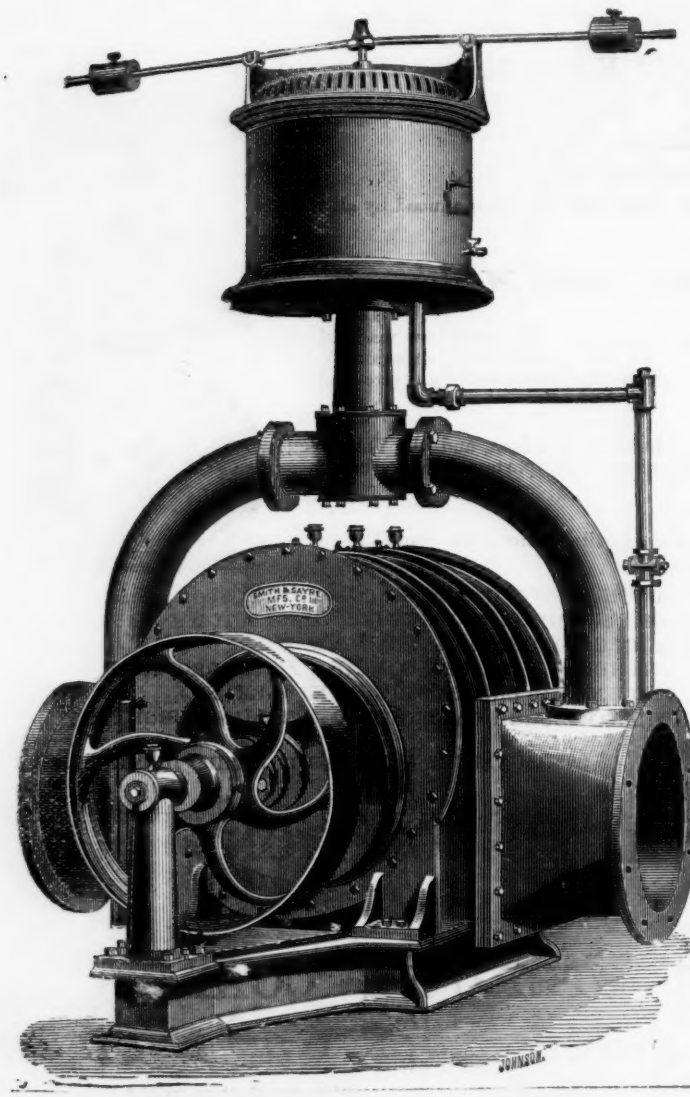
Respectfully yours,
WM. H. WARD, Sec.

Would also refer to the Gas Companies in the following places: New York City (Manhattan and New York Cos), Brooklyn, Albany, Troy, West Troy, Buffalo, Rochester, Oswego, Ogdensburg, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Toronto, Hamilton and Coburg in Canada; Chicago, Ill., and two companies in Milwaukee, Wis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-jo ints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary fan.

The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola and 33 per cent fuel. Address

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PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

APRIL 16, 1875.

DELIVERED IN NEW YORK.

English Cannel.

Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00

English Caking Coals.

Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00

British Province Coals.

Pictou			2 50
Block House—At Mines, $2 12, Gold			0 00
Caledonia—At Mines, $2 00, Gold			0 00
Little Glace Bay—At Mines, 1 87½, Gold			2 00
Lingan—At Mines, $2 25, Gold			0 00
Sydney—Old Mine			3 00
" Reserve Mine			2 25
" International			— —

(Duty, 75 cents per ton, gold. Freight to New York $2 25 currency. Cost of above coals delivered in New York, $5 25 @ $6 00½, currency.)

Pennsylvania Coals.

Penn Gas Coal—At Amboy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00

West Virginia Coals.

MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —

American Cannel Coals.

Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			12 50
Red Bank—at Philadelphia			7 60
" —at South Amboy			9 00

Asphalts.

Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

The Waverly Coal and Coke Company of Pittsburgh, have contracted with the Pittsburgh Gas-Light Co. for 40,000 tons of their Youghiogheny coal, on private terms,

GLOUCESTER IRON WORKS.

GLOUCESTER CITY, NEW JERSEY.

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PIPE CAST VERTICAL.

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Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS,

TELESCOPIC OR SINGLE.

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AUTOMATIC FIRE GOVERNOR.

PATENTED AUGUST 4, 1874.

It regulates the speed of Exhausters by controlling the fire. The least pressure on the Retorts opens the Damper in the Boiler Chimney and under them, and closes them as soon as the pressure is removed. Saves the boiler, fuel, and all attention, except to supply the fire. Come and see it, or address

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Gas Works, Yonkers, N. Y.

Gas Engineers,

AND PARTIES ENGAGED IN THE BUILDING OF

GAS WORKS,

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J. D. PATTON,
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A YOUNG MAN OF LIBERAL EDUCATION, WHO HAS spent many years in the study of gas, and working in a arge gas works, desires a situation as Superintendent of a works making 10,000 to 50,000 cubic feet daily. Has good reference as to ability; or would act as Assistant in large works. Would prefer a situation on the staff of a gas works uilder—draws well, and has experience in setting up appar-

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A. M. CALLENDER & CO.,
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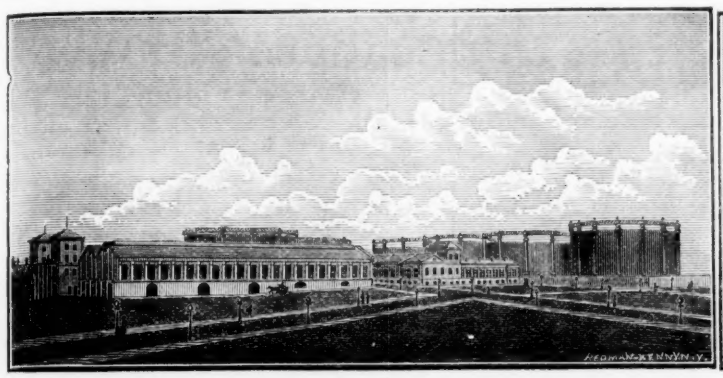
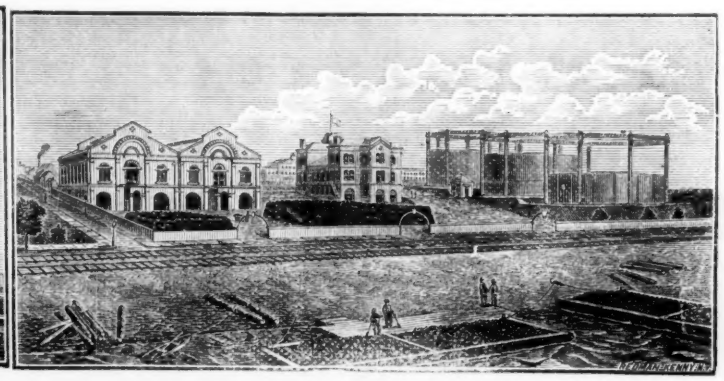


CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM. FARMER, ENG.



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Exhausters for Gas and Foul Lime Ventilation,
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GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
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W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
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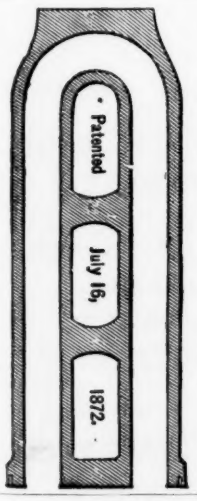
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company. St. Louis Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal.



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Price, $30 per Dozen.
Sample sent gratis to any Company, if desired.
☞ Smaller sizes on hand. Please address orders to A. SEE & SON,
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On or about May 1st, 1875,
One 8 Ft. STATION METER
complete, of American Meter Company's make, with a capacity of four hundred thousand cubic feet per day.
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ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,
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This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation, on most favorable terms.

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Manufacturers of a superior quality of

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Gas Tile, Drain Pipe, Fine Ground Fire Clay, &c.

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We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞SEND FOR CIRCULAR AND PRICE LIST.☜

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SHIPPING POINT—Baltimore, Md.

This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superio Coke, with little Ash, and scarcely any clinker. 304-1y

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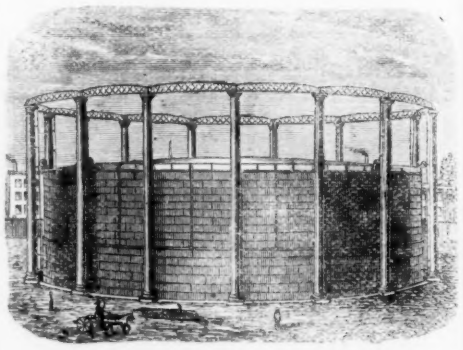
ENGINEER, AND MANUFACTURERS OF



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OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

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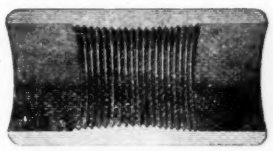

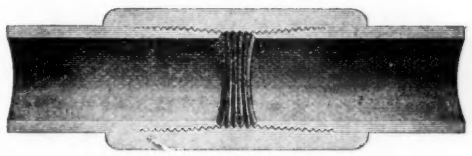

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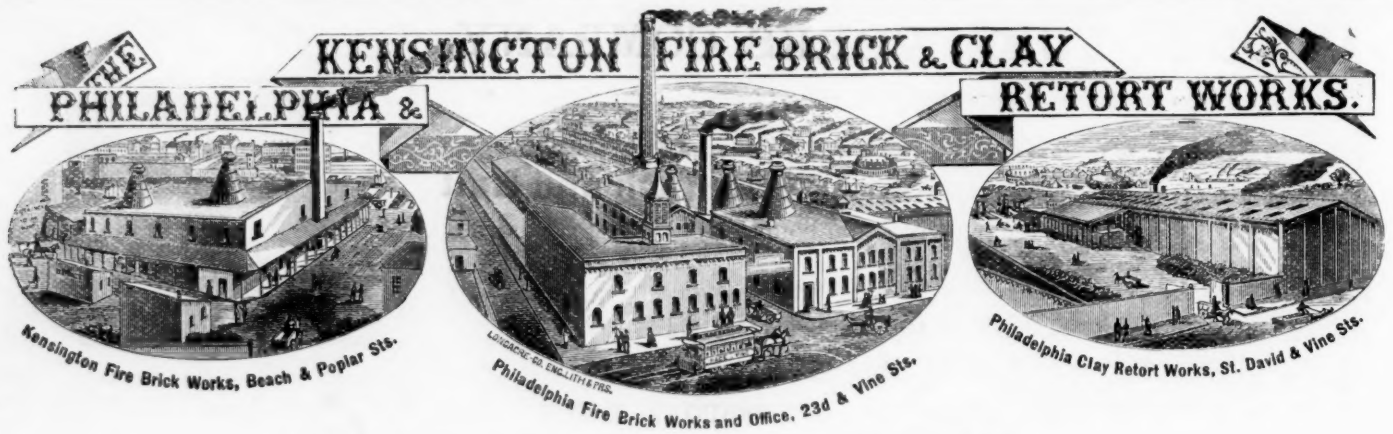
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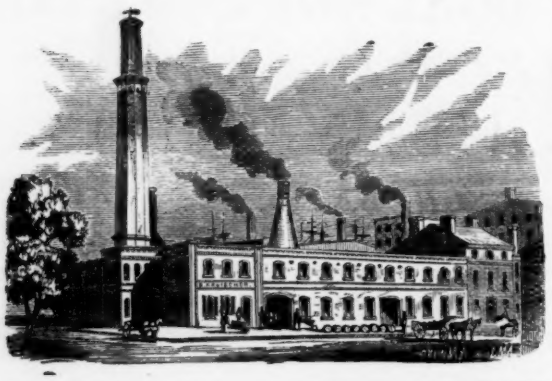

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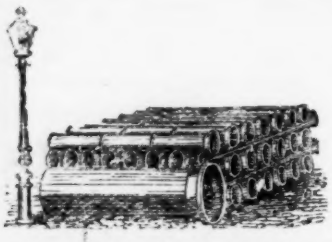

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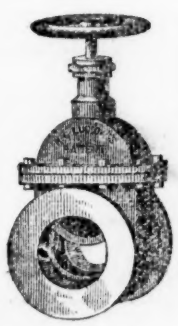

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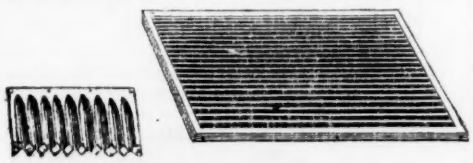

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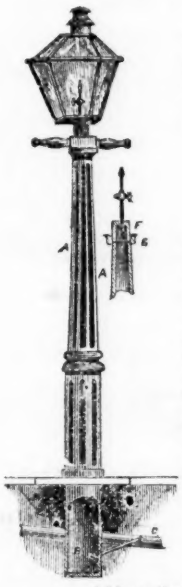

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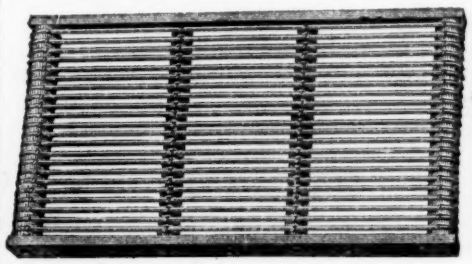

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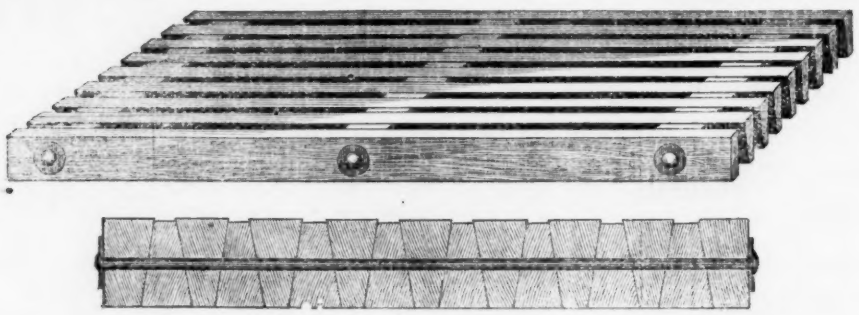

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